



SUCCESS IN REAL-TIME

USING REAL-TIME LABOR MARKET INFORMATION TO BUILD BETTER
MIDDLE-SKILL STEM PATHWAYS

By Ian Rosenblum and Christopher Spence | JANUARY 2015



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ABOUT THIS PUBLICATION

In the fall of 2013, Achieving the Dream and Jobs for the Future began examining how state policy can enable more community college students to earn credentials that provide access to robust and well-paying career opportunities in Science, Technology, Engineering and Mathematics (STEM). As an emphasis in that work, Achieving the Dream and

Jobs for the Future focused on the role community colleges can play in building supportive pathways that lead students directly into exciting STEM careers in their local labor markets, a process that takes advantage of the improved data now available through real-time labor market information. With generous support from The Leona M. and Harry B. Helmsley Charitable Trust, and through intensive collaboration with colleges and state policymakers, our organizations have created this policy brief so that states can support their colleges as they use high-quality, real-time labor market information to align the creation of middle-skill STEM pathways with robust career opportunities.

ACKNOWLEDGMENTS

This policy brief reflects the hard work of our partners in the STEM Regional Collaboratives, funded by The Leona M. and Harry B. Helmsley Charitable Trust, who began their work by examining real-time labor market information to ensure that the structured middle-skill pathways they were building would guide their students to real, and robust, career opportunities. In addition, we thank Mary V. L. Wright, Senior Program Director at Jobs for the Future, for her insights on how states should use real-time labor market information. We thank the following participants in the STEM Regional Collaboratives for their engagement in meetings, discussions, reviews and important projects:

- > Cuyahoga Community College
- > Miami Dade College
- > Norwalk Community College
- > Ohio Association of Community Colleges
- > Florida College System
- > Connecticut Board of Regents for Higher Education

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INTRODUCTION

The relationship between education and economic opportunity has never been stronger than it is today—with employment and wages directly proportional to Americans' levels of education and training (Baum 2014). This reality is creating deep, troubling and persistent income and wealth disparities between those with access to successful postsecondary education, and those without.

The gap that separates so many workers from the prospect of good-paying, stable jobs demands urgent action by states.

The gap that separates so many workers from the prospect of good-paying, stable jobs demands urgent action by states—even as the unrelenting fast pace of economic change makes a sound response all the more difficult and as the “rules of the game” continue to evolve. This is especially true in the Science, Technology, Engineering and Math (STEM) fields, where rapid growth holds the potential for significant employment gains while a skills gap holds back would-be workers from the employers who seek their talents.

By taking urgent action, states have the opportunity to level the playing field and create more equitable educational and career outcomes. STEM jobs pay a premium wage and offer access to dynamic careers, but African-Americans, Latinos and Native Americans are significantly underrepresented in STEM professions. According to the National Academy of Sciences, these groups comprised 28.5 percent of the U.S. population in 2006 but only 9.1 percent of college-educated individuals employed in science and engineering occupations (NRC 2011). To match their share of the overall population, the proportion of underrepresented minorities in STEM careers would need to triple (Dodson 2013).

We need to shift towards alignment as an ongoing and continuous process by which education and training providers must evolve at the same pace as, and in direct coordination with, regional employers and emerging industries.

The nation's media, politicians, and other opinion leaders tend to respond to this challenge—both for the economy as a whole and for STEM in particular—with a simple prescription: if more education means more jobs, then the answer must be more Bachelor's degrees. While there is no doubt that the nation faces a shortage of skilled workers with four-year degrees, there is another, equally important, solution. In fact, 30 percent of projected job openings by 2020 will require workers who hold more than a high school diploma but less than a Bachelor's degree; these largely technical jobs need employees with community college educations that result in industry credentials, postsecondary certifications and/or Associate's degrees (Carnevale, Smith, & Strohl 2013). Importantly, as demonstrated in the pages that follow, STEM openings—far from existing only at the top end of the education spectrum—are the driving force behind this “middle-skill” labor demand.

Keeping up with the evolving needs of employers in this fast-changing economy is a daunting task for any state, much less an individual college or university. While alignment has been a popular buzzword in the education and training sector for years, the kind of alignment required in the twenty-first century economy is not between what

employers need today and what a community college or training program can provide, but rather a shift towards alignment as an ongoing and continuous process by which education and training providers must evolve at the same pace as, and in direct coordination with, regional employers and emerging industries.

Real-time labor market information stands at the intersection of these trends and can play a powerful role in meeting the need for an alignment process for the modern economy—and especially for the middle-skill STEM careers that hold so much potential for the nation's future. By providing a window into the dynamic needs of employers—the knowledge, skills, experience, credentials and other assets they seek while hiring—real-time labor market information (LMI) gives states and their community colleges the ability to keep up with labor shifts and better prepare their citizenry for exciting career opportunities and advancement.

This document is intended to highlight some of the specific challenges states face in providing leadership to close the skills gap and to offer recommendations for harnessing real-time LMI to develop middle-skill STEM pathways to success at community colleges.

What Does “State” Mean?

For the purposes of this policy brief, “state” is defined as top elected and appointed policy-makers, including Governor's Offices and state-level agencies or intermediaries focused on improving community college student completion, such as state- or district-level community college systems (e.g., the Virginia Community College System), Student Success Centers (e.g., the Arkansas Center for Student Success), and boards/departments of higher education (e.g., Massachusetts Department of Higher Education and Oklahoma State Regents for Higher Education).

Local governance and context dictate what various state actors can do. Some will encourage colleges to make changes via board policy or incentives, others by statute, still others by spreading ideas and evidence through convenings and communications. The recommendations for state action in this brief can be used to set an agenda, and then be translated into appropriate local actions.

REVEALING THE “HIDDEN” MIDDLE- SKILL STEM LABOR MARKET

As the national economy has shifted, the debate surrounding the role of STEM jobs has been largely shaped by two myths: that STEM careers require a high level of skills and advanced education unattainable for most Americans, and that these jobs are centered in just a few big cities or technology hubs—in other words, that for one reason or another, STEM careers are out of reach for many of the workers struggling to succeed and earn a family-sustaining wage in today’s economy.

The way STEM is defined has contributed significantly to these conclusions. While there is no single definition of a STEM job, the U.S. Department of Commerce estimated in an issue brief released in 2011 that 7.6 million Americans—or approximately just 1 in 18 workers—had STEM positions. According to the Commerce analysis, “STEM employment currently makes up only a small fraction of U.S. employment” (Langdon et al. 2011).

Recent research dispels this STEM misperception and instead points to the great potential of so-called “middle-skill” STEM jobs to fuel economic growth and create pathways to stable jobs and solid wages for many more Americans.

The Brookings Institution’s 2013 report on “The Hidden STEM Economy” opens the door to a new understanding of STEM jobs, employer needs and opportunities for states and their higher

education and workforce development systems. Based on the U.S. Department of Labor's O*NET surveys capturing training, education, experience and skill-related work requirements, Brookings' Jonathan Rothwell estimates that 26 million jobs require a high level of STEM knowledge (Rothwell 2013). As a result, instead of representing about 5.5 percent of the workforce based on the narrow Commerce Department estimate of STEM professions, Rothwell revealed that fully 20 percent of U.S. jobs are truly STEM-related.

This broad perspective on STEM leads to helpful conclusions about the real on-ramps to STEM jobs and pathways to STEM careers. Rothwell estimates that more than one in three STEM positions require just an industry certification or Associate's degree, and that all told, half of all STEM jobs require less than a Bachelor's degree. These middle-skill STEM occupations are highly centralized in the health care, manufacturing and construction industries, and Brookings found that "these jobs pay \$53,000 on average—a wage 10 percent higher than jobs with similar educational requirements" (Rothwell 2013). Even a somewhat narrower STEM definition estimated that there are two job openings for every one unemployed STEM worker.¹

Brookings' research highlights another important fact about STEM in the twenty-first century: it is fully *nationwide* in scope. Rothwell found that STEM jobs requiring less than a Bachelor's degree are found in near proportion to the total population in large metropolitan, small metropolitan, and nonmetropolitan areas. The Brookings report noted that:

While there is fairly wide variation in the share of STEM jobs across metropolitan areas, much of that variation reflects the highest skilled STEM jobs in engineering, computers, and science. ... By contrast, STEM jobs that do not require a bachelor's or graduate degree are much more evenly spread across metropolitan areas. Among the largest 100 metropolitan areas, the share of all STEM jobs available to workers without

a bachelor's degree ranges from 7 percent in Las Vegas to 13 percent in Baton Rouge. This narrower band suggests that these STEM jobs often scale with population. Every city and large town needs mechanics and nurses. Meanwhile, scientists, engineers, and computer workers are more export-oriented and clustered (Rothwell 2013).

These data reveal that middle-skill STEM jobs are plentiful and essential for the economic health of communities across the country. STEM jobs are fast-growing and fast-changing occupations, and they require varying amounts of training and education below the Bachelor's degree level. They are also highly popular, with 45 percent of students pursuing an Associate's degree initially entering STEM fields (Chen 2013).

Given the fast-changing pace of STEM fields, middle-skill STEM jobs can only be a source of opportunity if states and their workforce and education partners are targeted in their approach. Community colleges need to be sure that their programs educate students for STEM jobs that offer a family-sustaining wage, target jobs that employers are actually trying to fill, and teach the skills that workers need. To do so, states must support their colleges in using high-quality data to target their decisions, investments, and priorities. This calls for a heightened focus on the use of labor market information, particularly real-time labor market information.

In addition, it is important to stress that *local* demand drives the programs offered by community colleges. While federal politicians might debate the need for more foreign-educated STEM PhDs with H1-B visas, community colleges are for the most part educating local students who want career opportunities at local factories, hospitals and technology firms. Given that reality, using real-time labor market information to ensure that community college programs align directly to their local demand is all the more critical.

TRADITIONAL AND REAL-TIME LABOR MARKET INFORMATION

The Brookings Institution report and other emerging research demonstrate the magnitude of available middle-skill jobs in STEM professions, and coupled with evidence on hard-to-fill vacancies in these fields, suggest the misalignment between demand for middle-skill STEM workers and the supply of educated and trained employees in communities across the country.² Yet these insights alone are too blunt to enable states to make policy decisions about the programs and curricula that their education and training programs should offer.

To identify specific labor market opportunities in their states and regions, workforce agencies and community colleges have increasingly drawn on *traditional labor market information*, which is based primarily on government surveys and employer interviews. Traditional LMI can provide point-in-time data on industry and occupation employment, wages, education and training levels, and projected growth; it is often available at state, regional, county, metropolitan, and Workforce Investment Area geographic levels.³

While traditional labor market information can be a useful tool, it is limited in its utility to policy-makers and colleges—particularly when it comes to emerging or fast-changing fields like STEM. A report by The Conference Board found that traditional LMI's most serious limitations include lag times that can make data outdated or less relevant by the time it is available, and trouble identifying emerging (rather than established) occupations and skill needs (Young 2014).

By contrast, *real-time labor market information* has the potential to address many of traditional LMI's shortcomings by bolstering the largely static information that it generates with more dynamic, technology-enabled data. Real-time LMI providers use the power of "big data" to spider—or sift through and aggregate results from—online job search engines frequently including "newspapers, job boards, social media sites (e.g., LinkedIn), corporate sites and government job boards" (Dorrer & Milfort 2012). Data is often updated daily and goes deeper than traditional LMI to analyze employers' needs.

As a result, real-time LMI:

- > Reveals new and emerging trends in occupational definitions
- > Offers insights into the skills and certifications sought by regional employers
- > Identifies early indications of market shifts
- > Tracks hiring demand⁴

Real-time LMI enables community colleges to align education and training programs with the actual and evolving needs of employers. Of course, it must be actually used—and used appropriately—to achieve this goal, and that requires addressing questions such as how real-time LMI can best be employed, by whom and in what context. In addition, real-time LMI relies on proprietary analytic tools developed by vendors, including Burning Glass Technologies, Geographic Solutions and Wanted Technologies (which is used by Career Builder, The Conference Board and Monster Government Solutions).⁵ This raises additional questions about how to select, procure, and pay for ongoing real-time LMI services.

For states, systematically addressing these questions will make it possible to support their community colleges as they take advantage of real-time LMI as a key element of effective STEM economic and workforce development policy.

RECOMMENDATIONS FOR STATE POLICY

Given the importance of real-time LMI for developing an effective policy agenda for middle-skill STEM jobs, states have an essential role to play in providing the vision, leadership, resources, and support for community colleges and other partners to successfully implement comprehensive real-time LMI strategies.

Drawing on best practices from states, college systems and individuals institutions, the following recommendations offer a framework for supporting the use of real-time LMI as community colleges build pathways to completion in middle-skill STEM fields.

Five Recommendations for States to Support the Use of Real-Time LMI in Developing Middle-Skill STEM Pathways that Lead to Robust STEM Careers

1. Implement real-time LMI as a long-term change management strategy—not a one-time tool
2. Make real-time LMI available and usable by community colleges and other stakeholders
3. Strengthen state-level data systems to support real-time LMI
4. Support institutions' use of LMI through technical assistance and professional development
5. Integrate real-time LMI into critical ongoing decision-making

RECOMMENDATION 1: IMPLEMENT REAL-TIME LABOR MARKET INFORMATION AS A LONG-TERM CHANGE MANAGEMENT STRATEGY— NOT A ONE-TIME TOOL

One of the most important benefits of using real-time LMI is that it provides a *dynamic* picture of the job and skills market. A state's overall approach to labor market information should likewise position real-time LMI not as a tool for one-time decision-making—which would be quickly outdated—but rather as the bedrock of a long-term strategy for linking employers, community colleges, workforce systems, economic development agencies and other stakeholders to ensure the ongoing alignment of a state's education and training systems.

Implementing real-time LMI as a change management tool can help states improve the preparation of students for middle-skill STEM jobs by addressing some of the systemic barriers to improved performance and alignment. As a study by Davis Jenkins at the Community College Research Center concluded: "Research on community colleges suggests that these institutions are often weak in several areas of high-performing practice, including functional alignment, use of data for improvement, and external linkages.... Creating deep, sustainable reforms in organizational practice requires changing beliefs and norms of practice" (Jenkins 2011). Community college leaders recognize the importance of aligning curriculum with real labor market opportunities, and they see this as a still-unmet need; according to a survey conducted by Jobs for the Future: "Most college leaders—88 percent—say that successful alignment is a 'very high priority,' compared with overall institutional priorities. But less than half—only 41 percent—say their colleges are 'very effective' at aligning programs with the labor market needs in their region. Another 58 percent think their efforts are 'somewhat effective.'"⁶

To achieve this fundamental shift, states should develop a broad understanding among key

stakeholders—including policymakers, employers, and K-12 and higher education leaders and practitioners—about the importance of integrating real-time LMI throughout their work, develop their capacity to effectively do so, and reward the successful use of real-time LMI through incentives that encourage maintaining and institutionalizing decision-making based on the real needs of employers and job markets. Finally, states should develop metrics to measure the utilization and integration of real-time LMI in order to ensure that it is being used effectively.

Colorado has integrated the use of real-time LMI into its strategic planning and institutional alignment processes for workforce development through the Colorado STEM Education Roadmap, which is the state's action plan for coordinating and aligning education and job training in the STEM fields.⁷ Employers and education stakeholders used real-time labor market information in the development of the Roadmap and incorporated industry input from two related ongoing initiatives that focus on middle-skill STEM pathways:

- > **Regional industry-led sector partnerships** that draw on real-time LMI as the starting point for conversations between the Colorado Workforce Development Council, Colorado Department of Higher Education, local workforce agencies, K-12 and postsecondary leaders, economic development, and industry stakeholders. Each region began by identifying the industries that are driving their regional economies using data on industry and cluster concentration, sector employment and wages, and then looked deeper at top occupations by examining labor market information on job openings, projected employment growth and other data. Two sectors with a high proportion of middle-skill STEM jobs—manufacturing and health care—are the most common regional areas of focus.
- > **Establishing career pathways** that are clearly defined sequences of education and training programs, with integrated support services, "that enable individuals to advance over time to successively higher levels of education and

employment in a given industry sector and set of occupations.”⁸ Career pathways are aligned to the regional industry sector partnerships and supported by labor market information from workforce agencies and economic development partners. In addition, in May 2013, Colorado Governor John Hickenlooper signed legislation requiring the establishment of a manufacturing career pathway that explicitly calls for stackable credentials, industry certifications and multiple levels of postsecondary degrees, and that calls for publication of key labor market information on careers linked to the pathway.⁹

As another example, the Kentucky Community & Technical College System (KCTCS) has been a leader in piloting the Dynamic Skills Audit (DSA) throughout the 16 KCTCS colleges.¹⁰ The DSA, developed by Jobs for the Future, is a structured, data-driven process that utilizes both traditional and real-time labor market information along with a highly structured employer engagement process to assess community college curriculum content.¹¹ The DSA has four key steps:

- > **Skills analysis:** A systematic analysis of occupations that draws out skill and credential requirements
- > **Skills matrix development:** A comparative matrix that checks for alignment between the skills called for by employers and the programs and curricula offered by a college
- > **Assessment and verification with partners:** A deliberate process of engaging employers in productive, structured conversations that verify needed skills
- > **Monitoring skills demand:** Due to the dynamic nature of LMI, the college engages in a continuous process of monitoring and analyzing data

Early experiences with the KCTCS colleges indicate that the process has resulted in a more structured and strategic approach to utilizing real-time LMI data as part of the curricula review process and for discussions with industry representatives.

RECOMMENDATION 2: MAKE REAL-TIME LABOR MARKET INFORMATION AVAILABLE AND USABLE BY COMMUNITY COLLEGES AND OTHER STAKEHOLDERS

Real-time LMI from online job search engines and other sources provided by third-party vendors complements the internal data generated by state agencies and other providers of traditional labor market data. States can play an important role in helping higher education institutions, as well as other workforce partners, access proprietary real-time LMI from third-party vendors like Burning Glass Technologies, Geographic Solutions, and Wanted Technologies. Major vendors such as these all require a license or subscription, and costs vary depending on factors ranging from geographic scope to the number of users and licenses required (Maher & Maher 2014).

States should consider ways to serve as a coordinator, convener and/or contractor on behalf of their community colleges (and, if appropriate, other stakeholders such as workforce agencies) that need to access third-party real-time LMI. State action can include evaluating and sharing information on vendors, creating common standards of use, establishing model Requests for Proposals and contracts, and/or setting up a single statewide contract with multiple end users. In addition, as noted earlier, continued financial support for real-time LMI products and integration is an important element of state leadership.

For example, Kentucky and Massachusetts have executed state-level contracts with real-time LMI vendors to enable community colleges and other stakeholders to access data.¹² Pennsylvania, Florida and New Jersey have also demonstrated leadership in making real-time LMI products available to workforce and higher education stakeholders (Maher & Maher 2014). Strategies used by these states include public monthly reports that draw on traditional and real-time LMI, sharing data and

analysis with regional workforce intermediaries and training providers, identifying industries and sectors that represent strategic opportunities for economic and workforce development, and providing job opening and wage data directly to consumers.

RECOMMENDATION 3: STRENGTHEN STATE-LEVEL DATA SYSTEMS TO SUPPORT REAL-TIME LABOR MARKET INFORMATION

The most consistent and effective use of real-time labor market information is predicated on states implementing systems to generate and disseminate valuable data. States should create seamlessly linked data systems that follow students from pre-K into the workforce, with particular emphasis on incorporating real-time labor market information and providing the kinds of data that will be most helpful for aligning education and training programs. Data that follows students from educational programs into the labor market is especially important for middle-skill STEM fields, which are often marked by fast-changing technological advances and employer needs, and thus require a mechanism that ensures education programs and their graduates are keeping pace.

According to the Data Quality Campaign, only 18 states have linked data systems across the pipeline from early learning to K-12, postsecondary, workforce, and social services. State progress in this area is deeply fragmented:

- > 43 states link early childhood and K-12 data
- > 44 states link K-12 and postsecondary data
- > 24 states link postsecondary and workforce data
- > 19 states link K-12 and workforce data¹³

As described in greater detail in Recommendation 5, California has successfully used Unemployment Insurance data to measure the employment outcomes for community college students. Linking records from the California Employment

Development Department to community college students has enabled California to work with data including: employment, wage and wage growth by degree, employee transitions among industries over time, and the type of industries that hire employees with certain degrees.¹⁴ In addition to being examined at the system level, this information is provided to community colleges so that it can be incorporated into their decision-making.

Kentucky has been a pioneer in linking its data systems and was recognized by the Data Quality Campaign as an exemplar for providing teacher access to comprehensive student data, including student longitudinal data and K-12 and postsecondary data linkages.¹⁵ In 2013, the state built on its earlier work by enacting legislation to establish an Office for Education and Workforce Statistics “to link the data and generate timely reports about student performance through employment to be used to guide decision makers in improving the Commonwealth of Kentucky’s education system and training programs.”¹⁶ Among other research products, the state publishes Postsecondary Feedback Reports that feature detailed employment and wage outcomes for completers and non-completers, including data broken down by degree and certificate subject areas.¹⁷

Colorado has also taken several steps to seamlessly link data—including real-time LMI—across higher education systems and with workforce development partners. The state’s Interagency Data Sharing Task Force convenes the Department of Higher Education, Colorado Community College System, Department of Education, Department of Labor & Employment and other stakeholders to coordinate these efforts with a focus on education and employment, including student transitions across the various systems, and to eliminate barriers to data-sharing. For example, the task force has produced data-sharing agreements to enable linkages and addressed technical issues during implementation.¹⁸

RECOMMENDATION 4: SUPPORT INSTITUTIONS' USE OF REAL-TIME LABOR MARKET INFORMATION THROUGH TECHNICAL ASSISTANCE AND PROFESSIONAL DEVELOPMENT

To implement successful strategies that develop and align middle-skill STEM pathways using real-time labor market information, states must help community colleges create capacity and knowledge among key stakeholders. States should complement an overall vision that embraces and directs the use of real-time labor market information in education and training systems with practical and comprehensive efforts to provide technical assistance, professional development, and other critical supports—including financial resources.

Research indicates that strategies to help employees understand and embrace change are consistently used by high-performing organizations (Bacow et al. 2012; Jenkins 2011). As the Community College Research Center has noted: “high-performance work systems...[help] employees strengthen their knowledge, skills, and abilities [KSAs]...[and involve and empower] them to use their KSAs for the benefit of the organization” (Jenkins 2011).

A number of standalone and regional efforts that are already underway provide a blueprint for building capacity to effectively use labor market information—from Kentucky’s longstanding efforts described above to the Workforce Intelligence Network of Southeastern Michigan. The Workforce Intelligence Network’s mission is to create a comprehensive and cohesive workforce development system in its region, and it articulates “data” as its first goal, defined as, “provide current and actionable labor market intelligence to allow for greater regional talent system effectiveness” (Workforce Intelligence Network of Southeastern Michigan 2013). To bring these and other best practices to scale, states should consider key steps including:

- > **Creating peer networks** of institutions based on their industry sector(s) of focus, region and/or other commonalities and providing ongoing technical assistance that shows stakeholders how to maximize the use of real-time labor market information.¹⁹
- > **Delivering high-quality professional development** to practitioners from the range of education, training, and economic development stakeholders. Professional development should encourage buy-in for the use of real-time labor market information, encouraging the institutional research field to expand its role into helping the colleges develop future strategies. It should also provide community college representatives and other participants with specific, job-embedded and relevant skills so that they can effectively understand and use this important data. All staff members do not need the same level of expertise in interpreting real-time LMI; rather, states should ensure a common base of information and commitment—including knowing where they can access the real-time LMI that they need—and provide specialists with more advanced levels of training and skill development.
- > **Focusing on extending the institutional research (IR) capacity of under-resourced colleges.** Some community colleges have extensive IR capacity and are able to integrate the use of real-time LMI with their existing staff. But plenty of community colleges have little or no staff dedicated to institutional research. State-level agencies or intermediaries can identify the colleges most in need of support and provide extra assistance, either through centralized staff or through connections to other colleges.

For example, Massachusetts has integrated real-time labor market information from The Conference Board’s Help Wanted OnLine product into the economic data that it makes available to the public and to community colleges.²⁰ As an important aspect of its implementation, the state has committed to professional development for key

State Experience Implementing Real-Time LMI Products

A study conducted for the U.S. Department of Labor's Employment and Training Administration, Office of Workforce Investment, by Maher & Maher in collaboration with Jobs for the Future and the New York City Labor Market Information Service found common themes among three states that have implemented real-time LMI—Pennsylvania, Florida and New Jersey:

- > **Reliability of data:** "All states reported strong overall improvement [in data reliability] since their RT LMI subscriptions began."
- > **Limitations of the data:** "Postings data varies across industries and occupations, and also a job posting is not directly synonymous with a job vacancy. . . . For this reason, the states acknowledge the value of job postings data as a supplement to more established forms of labor market monitoring, not as a replacement."
- > **Need for trained LMI specialists in using the data:** "All of the states recognize the importance of having analysts with training on using labor market data and familiarity with the regional issues to make the best use of RT LMI. . . . Users are also more successful in utilizing the tool when there is strong leadership support for its adoption into the decision making structure or in launching new product or strategy development."
- > **Usefulness to stakeholders:** "All the users reported being able to develop new reports and more in-depth analysis for other departments within the state, elected officials, businesses, and state residents."

community college staff—including administrators, institutional research, academic planning, advising, career counseling, and development staff—and has partnered with Jobs for the Future to provide training on using real-time LMI to improve college services.

RECOMMENDATION 5: INTEGRATE REAL-TIME LABOR MARKET INFORMATION INTO CRITICAL ONGOING DECISION- MAKING

The first four recommendations address how states can establish the context and conditions for successful use of real-time labor market information; the final—and crucial—step is to ensure that LMI is integrated throughout key decision-making at the state, system, and institutional levels.


Strengthening the links between education and training programs and real-world career opportunities is essential to encouraging program completion and subsequent student success in middle-skill STEM fields. A significant body of research points to the importance of contextualization and work-based learning opportunities that offer career content immediately (Morgan et al. 2012; Altstadt, Flynn, & Wilson 2012; Jenkins, Zeidenberg, & Kienzl 2009);²¹ establishing multiple pathways for students, particularly in math, based on their starting point and their planned course of study (Bryk & Treisman 2010; Shaughnessy 2011); and using meta-majors and defined pathways to encourage students to select their planned program of study as early as possible and reduce information overload in order to improve completion rates (Charles A. Dana Center et al. 2012). To be effective, all of these strategies require that real-time labor market information be embedded in program decision-making.

States should articulate clear expectations and develop policies and incentives to ensure that real-time LMI is incorporated into:

- > **Program evaluation**, such as determining whether a course of study is needed (i.e., does it prepare students for actual opportunities in the labor market) and measuring how successful students are in the workplace
- > **Curriculum evaluation**, including the extent to which courses are providing the knowledge and skills that employers need and how to continuously enhance this alignment
- > **Employer engagement**, by using real-time LMI to structure conversations with employers
- > **Student-facing supports and services**, including advising and career pathways, with an emphasis on ensuring that advisors use real-time LMI to help students choose programs that lead to significant career opportunities
- > **Institutional strategic planning**, such as grant development and other administrative uses


For example, the California Community Colleges Chancellor's Office launched an online Salary Surfer application to provide transparent consumer information about the earnings of graduates before and after program completion.²² California uses Unemployment Insurance wage data as its source, and the website provides median wages for three periods: two years prior to program completion, two years following program completion, and five years following program completion.²³ The easy-to-use real-time LMI portal is designed to encourage students to explore and select majors earlier so that they can quickly begin a pathway to degree or certificate completion and complete any necessary remedial work. California is planning to work with community college counselors to help them use the portal, and the system office will disseminate best practices to encourage institutions to use the Salary Surfer with students.

The following illustration shows California's Salary Surfer output page for the Computer and Information Science sector:



SalarySurfer

California Community Colleges Chancellor's Office



STUDENT SUCCESS

INTERACTIVE

Computer and Information Science

☒ Display only programs with wage data

Computer and Information Science

Instructional programs in the theories, principles, and methods of design, development and application of computer capabilities to data storage and manipulation.

Curriculum	Award Type	Median Annual Salary		
		2 Years Before	2 Years After	5 Years After
Computer Information Systems	Degree	\$23,238	\$31,440	\$40,093
Computer Information Systems	Certificate	\$18,088	\$32,098	\$44,611
Computer Infrastructure and Support	Degree	\$32,673	\$44,392	N/A
Computer Networking	Degree	\$28,116	\$52,211	\$63,016
Computer Networking	Certificate	\$35,106	\$50,472	\$56,453
Computer Programming	Degree	\$24,547	\$39,556	\$55,248
Computer Programming	Certificate	\$30,611	\$46,561	\$44,059
Computer Science (Transfer)	Degree	\$21,670	\$39,302	\$71,111
Computer Support	Degree	\$35,025	\$37,002	\$38,096
Computer Support	Certificate	\$19,422	\$37,723	\$43,667
Information Technology, General	Degree	\$25,345	\$36,696	\$42,433
Information Technology, General	Certificate	\$22,416	\$40,333	\$41,773
Software Applications	Degree	\$21,034	\$29,436	\$34,497
Software Applications	Certificate	\$17,874	\$24,425	\$32,298

The Florida College System has also developed a similar web portal called [Smart College Choices](#). The image below shows Florida's output data

for Associate's degrees in Networking Services Technology:



Program Search	
Program Type	Associate in Science (AS)
Program Title	Networking Services Technology
<input type="button" value="Clear"/>	

2010-11 Student Outcomes
College(s) offering Associate in Science (AS) in Networking Services Technology



(Download Spreadsheet)

1 2						
College/District	Number Completed	Number Continued Education	Percent Continued Education	Number Employed	Percent Employed	Estimated Average Annual Full-Time Wage
Florida State College at Jacksonville	39	17	43%	27	69%	\$42,996
Daytona State College	36	14	38%	22	61%	\$35,520
Miami Dade College	25	8	32%	16	64%	\$41,632
Palm Beach State College	20	10	50%	14	70%	\$32,284
Brevard Community College	19	13	68%	13	68%	\$39,988
Seminole State College of Florida	19	8	42%	12	63%	\$39,264
Edison State College	17	8	47%	12	70%	\$41,536
Santa Fe College	16	5	31%	13	81%	\$33,784
St. Petersburg College	15	7	46%	11	73%	\$55,552
Broward College	14	8	57%	11	78%	\$35,412

California community colleges are also using real-time labor market information to ensure alignment with workforce needs, including making decisions about program continuation. At San Joaquin Delta College, administrators eliminated seven programs after a comprehensive review that included employment projections and wage data. In describing the rationale and process behind the eliminations, the college articulated its commitment to "ensuring that programs offered by the College aligned with the labor market needs in the regional community."²⁴

In Ohio, 15 Central Ohio school districts received a grant from the State Department of Education's innovation-focused "Straight A Fund" to establish pathways from high school to middle-skill careers and facilitate college readiness. These pathways extend existing efforts to leverage career and technical education, early college/dual enrollment, and work-based learning in targeted industry

sectors. Planners used real-time labor market information to identify appropriate career pathways and prioritize essential skills for students to master. Each pathway is expected to facilitate career exploration, experiential learning and, potentially, result in an industry-recognized credential and/or significant college credit accumulation.²⁵ The model is based on the premise that a "shift away from insular programming that exists only within a school, district, college, or other organization means the programs are positioned to be responsive to changes in the landscape, including industry needs, educational requirements, and student demand."²⁶ Jobs for the Future is assisting the Ohio partnership in implementing the Pathways to Prosperity framework—locally branded as Innovation Generation—in participating schools. The Pathways to Prosperity framework is designed to help states create career pathways in grades 9-14 with the goal of providing students

systematic, sustained exposure to the world of work and careers, and an educational experience that integrates academic and technical skills leading to a postsecondary credential with value in the labor market (JFF 2014).

A number of states are also using real-time LMI to build industry partnerships in key sectors, particularly for middle-skill STEM careers, and to use the feedback from these partnerships to refine and align their education and training programs. Pennsylvania launched its Industry Partnership

initiative in 2005 (Herzenberg 2011), and states including Maryland have followed and built on this strategy and further tailored it to STEM fields.²⁷ In New Jersey, the state has established “strategic partnerships of employers, educators, and workforce development professionals working together to strengthen the workforce for their industries.” These Talent Networks draw on labor market information to identify and fill skill gaps in STEM sectors including advanced manufacturing, health care, technology and entrepreneurship, life sciences, and transportation/logistics/distribution.²⁸

CONCLUSION

Middle-skill STEM jobs have the potential to serve as a boon to state economic development efforts and an opportunity for our nation's students—especially for the low-income students and students of color who disproportionately enroll at community colleges and are underrepresented in STEM fields.

Harnessing this opportunity requires that states keep up with the fast pace of change in STEM fields, and real-time labor market information can be the bedrock of this strategy. By establishing a paradigm of alignment with employers' needs, state policy can encourage successful completion of middle-skill STEM pathways—and, most importantly, career success and advancement to follow.

ENDNOTES

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⁸ Templin Lesh, Emily. Presentation given March 21-22, 2013. "Sector Partnerships and Career Pathways." Colorado Workforce Development Council.

⁹ Colorado House Bill 13-1165. See: [http://www.leg.state.co.us/clics/clics2013a/csl.nsf/fsbillcont3/FD81557AE76C4A8F87257AF4007998E9/\\$FILE/1165_enr.pdf](http://www.leg.state.co.us/clics/clics2013a/csl.nsf/fsbillcont3/FD81557AE76C4A8F87257AF4007998E9/$FILE/1165_enr.pdf)

- ¹⁰ Kentucky Community & Technical College System. "Memorandum: President's Report, Board of Regents Meeting, June 14, 2013." http://legacy.kctcs.edu/organization/board/meetings/201306/01_Board/Pres%20Rpt%20to%20Board-ENGAGEMENT-June%202013%20letterhead.pdf
- ¹¹ See: <http://www.jff.org/services/labor-market-information-services/how-we-help>
- ¹² Telephone interview with Mary Wright, Jobs for the Future. August 1, 2014.
- ¹³ See: <http://www2.dataqualitycampaign.org/your-states-progress/10-state-actions?action=one>
- ¹⁴ Perry, Patrick. Presentation given November 20, 2013. "Labor Market Resources." California Community Colleges.
- ¹⁵ See: <http://www2.dataqualitycampaign.org/your-states-progress/by-state/overview?state=KY>
- ¹⁶ Kentucky House Bill 240 of 2013. See: <http://legiscan.com/ky/bill/HB240/2013>
- ¹⁷ See: <http://www.kcews.ky.gov/Reports/PSFeedBack/PSFeedbackReports.aspx>
- ¹⁸ Telephone interview with Emily Templin Lesh, Colorado Workforce Development Council. October 2, 2014.
- ¹⁹ Jobs for the Future runs the Innovators Network, for example, which helps community colleges and community college systems build their capacity to use and integrate real-time labor market information. See: <http://www.jff.org/initiatives/credentials-work/innovators-network>
- ²⁰ See, for example: <http://www.cmwib.org/uploads/7b/c9/7bc9fc6fed780b8b9657f547639a0df2/central-ma-economic-snapshot.pdf>
- ²¹ See the *Breaking Through Contextualization Toolkit*, available at <http://www.jff.org/publications/breaking-through-practice-guide> or http://www.jff.org/sites/default/files/publications/materials/BT_toolkit_June7.pdf
- ²² See: <http://salarysurfer.cccco.edu/SalarySurfer.aspx>
- ²³ California Community Colleges Chancellor's Office. n.d. "Salary Surfer Methodology." Accessed October 5, 2014. <http://extranet.cccco.edu/Portals/1/TRIS/Research/wages/Salary%20Surfer%20Methodology.pdf>
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